

11-15-00

A

REGISTERED PATENT ATTORNEY
JOHN JAMES MCGLEW J.D., NY, NJ, DC BARS
THEOBALD DENGLE, PATENT AGENT
KRISTINA M. GRASSO, PATENT AGENT
HILDA S. MCGLEW M.D., PATENT AGENT



McGLEW AND TUTTLE, P.C.

Counselors at Law

SCARBOROUGH STATION
SCARBOROUGH, NEW YORK 10510-0827

TEL: (914) 941-5600

FACSIMILE: (914) 941-5855

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November 14, 2000

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Re: Our File 68616

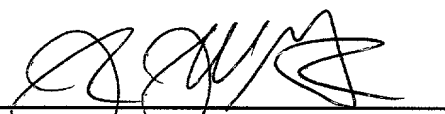
Sir:

Enclosed, please find a new patent application in the name(s) of :
Emil ASCHENBRUCK, Hans WEIBEL, Dr. Markus BEUKENBERG
for: SYSTEM FOR BURNING A PROCESSED FUEL GAS
comprising the following:

- (X) 1. Specification with 7 claims.
- (X) 2. Declaration, Power of Attorney and Petition
- (X) 3. Check in the amount of \$750.00, including:
Official Government Filing Fee \$710.00
- (X) 4. Assignment and recordation fee \$40.00
- (X) 5. Formal Drawings (1 sheet)
- (X) 6. Certified copy of:
199 55 680.6
the priority of which is hereby claimed under 35 USC 119.

The Patent and Trademark Office is hereby authorized to charge any fee required to our
Deposit Account 13-0410.

Respectfully submitted
for Applicant(s),

By: 
John James McGlew
Reg. No. 31,903
McGLEW AND TUTTLE, P.C.

JJM:tf

Enclosures: - As indicated above

Docket # 68616

SYSTEM FOR BURNING A PROCESSED FUEL GAS

FIELD OF THE INVENTION

The present invention pertains to a system for burning a fuel gas processed and preheated in a processing unit in a burner in a gas turbine unit or in a boiler plant.

BACKGROUND OF THE INVENTION

5 Fuel gas is increasingly used to operate gas turbine units and boiler plants. Due to irregularities in the processing of fuel gas (e.g., natural gas) or great fluctuations in the quality of the fuel gas, fuel condensate may precipitate unnoticed. Since the fuel nozzles designed for

operation with gas do not atomize the liquid components of the fuel gas, these liquid components are transported through the combustion space proper without participating in the combustion because of the high kinetic energy. If these high-energy liquid drops then come into contact with machine or unit parts, the liquid drops are atomized by the energy of the impact.

5 Ignitable mixtures are formed due to the atomization and due to the air present, and these mixtures cause uncontrolled combustion processes due to flashback. Since the areas affected are not designed for combustion temperatures, the extent of damage is considerable in such cases and it may even lead to complete failure of the machine or unit. The solutions used hitherto to avoid these drawbacks are focused on making the processing of the fuel gas more
10 reliable at a great effort.

SUMMARY AND OBJECTS OF THE INVENTION

The basic object of the present invention is to protect the unit parts located downstream of the burner in a unit of this type from damage from condensate parts possibly present in the fuel gas more reliably and at a reduced effort.

15 According to the invention a system for burning a fuel gas is provided in which the gas is processed and preheated in a processing unit, in a burner in a gas turbine unit or in a boiler plant. The burner is connected via a line to the processing unit. A continuously operating detector is provided for determining the condensate content in the processed fuel gas. The detector is arranged in the line immediately before the burner. The detector is connected to an
20 alarm and a shut-off.

5 The final state of the processed fuel gas is monitored by the detector arranged immediately before the burner. A high level of protection of the machine and unit is achieved by this monitoring and by the measures to be taken thereafter. In addition, unnecessary increased safety margins are eliminated during the heating of the fuel gas, so that it becomes possible to reduce the secondary energies. Likewise, malfunctions in the fuel gas processing (filtration, condensate separator, fuel gas heating) as well as variations in the quality of the fuel gas are continuously checked with respect to the precipitation of condensate in the end product of the fuel processing.

10 An exemplary embodiment of the present invention is shown in the drawing and will be explained in greater detail below.

15 The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawing and descriptive matter in which a preferred embodiment of the invention is illustrated.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

The only Figure is a schematic view of a gas turbine unit according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in particular, the gas turbine unit comprises a gas turbine 1, which is coupled with a generator 2 for generating electricity and with a compressor 3 for compressing combustion air. The compressor 3 delivers the compressed combustion air to a combustion chamber 4, in which the processed fuel gas is burned under pressure. The combustion gas formed in the process is fed to the inlet of the gas turbine 1.

The combustion chamber 4 is provided with a burner, which is connected to a processing unit 6 via a line 5. The fuel gas is filtered, freed from condensate and preheated in this processing unit 6. The fuel gas thus processed is fed to the burner of the combustion chamber 4 via the line 5.

A connection 7 for a test line 8, via which a partial stream of the fuel gas being fed via the line 5 is removed, is arranged in the line 5 in the immediate vicinity of the entry into the burner. The test line 8 is connected to a continuously operating detector 9. The condensate content in the fuel gas is determined in the detector 9.

The detector 9 is provided with an alarm device 10 and with a shut-off device 11. When the detector 9 determines an excessively high condensate content in the fuel gas, an alarm is triggered via the alarm device 10 and the feed of fuel gas to the burner is interrupted via the shut-off device 11.

Instead of in a gas turbine unit, the system described may also be used in a boiler plant.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the

invention may be embodied otherwise without departing from such principles.

WHAT IS CLAIMED IS:

5 1. A system for burning a fuel gas, the system comprising:
a processing unit for processing and preheating the gas;
a gas line;
a burner connected to said processing unit via said gas line;
a gas turbine unit or a boiler plant operatively connected to said burner;
a continuously operating detector for determining the condensate content in the
processed fuel gas, said detector being arranged connected to said line before said burner;
an alarm device connected to said detector; and
a shut-off device connected to said detector.

2. A system according to claim 1, wherein said shut-off device includes a valve
connected to said detector via said alarm device.

3 A system for burning a fuel gas, the system comprising:
a processing unit for processing gas;
a gas line;
a burner connected to said processing unit via said gas line;
5 a gas turbine unit or a boiler plant operatively connected to said burner;
a continuously operating detector for determining the condensate content in the

processed fuel gas, said detector being arranged connected to said line before said burner.

4. A system according to claim 3, further comprising:

an alarm device connected to said detector; and

a shut-off device connected to said detector wherein said shut-off device includes a valve connected to said detector via said alarm device.

5. A method for burning a fuel gas, the method comprising the steps of:

processing and preheating fuel gas;

conveying the processed fuel gas in a gas line to a burner;

burning the conveyed fuel gas in the burner to generate combustion gas;

feeding the combustion gas to a gas turbine unit or a boiler plant;

continuously operating a detector during said step of conveying for determining the condensate content in the processed fuel gas being conveyed; and

triggering an alarm signal when the detector determines the fuel gas has reached a condensate content above a threshold.

6. A method for burning a fuel gas according to claim 5, further comprising the steps of:

providing a shut-off device connected to said detector for shutting off said conveying of fuel gas wherein said shut-off device responds to said alarm signal.

7. A method according to claim 6, wherein said shut-off device includes a valve connected to said detector via an alarm device, said alarm device for generating said alarm signal.

ABSTRACT OF THE DISCLOSURE

A fuel gas processed and preheated in a processing unit (6) is burned in a gas turbine unit or in a boiler plant. A continuously operating detector (9) for determining the condensate content in the processed fuel gas is arranged in a line (5) connecting the processing unit (6) with the burner immediately before the burner. This detector (9) is connected to an alarm device (10) and to a shut-off device (11).

The diagram illustrates a vacuum furnace system. At the bottom, a vacuum pump (1) is connected to a furnace chamber (4) which contains a sample (3). The furnace chamber is also connected to a gas inlet (2) labeled 'G'. Above the furnace chamber, a vertical line (5) leads to a valve (11). To the right of the valve, a horizontal line (8) passes through a component (7) and connects to a rectangular block (9). A dashed line extends from block 9 to another rectangular block (10). A vertical line (6) connects block 10 to a top rectangular block (6). The entire system is enclosed in a dashed rectangular boundary.

DECLARATION FOR PATENT APPLICATION

Docket No.68616

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: SYSTEM FOR BURNING A PROCESSED FUEL GAS

the specification of which

(Check one) ☒ is attached hereto.

☐ was filed on _____ as

Application Serial No. _____

and was amended on _____

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

199 55 680.6
(Number)

Germany
(Country)

19/Nov./1999
(Day/Month/Year filed)

Priority Claimed
YES

(Number)

(Country)

(Day/Month/Year filed)

(Number)

(Country)

(Day/Month/Year filed)

(Number)

(Day/Month/Year filed)

I hereby claim the benefit under Title 35, United States Code, 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No)

(Filing Date)

(Patented, Pending, Abandoned)

(Application Serial No)

(Filing Date)

(Patented, Pending, Abandoned)

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: **John J. McGlew, Reg. 17,722; and/or John James McGlew, Reg. 31,903; and/or Hilda S. McGlew Reg. 30,295; and/or Theobald Dengler, Reg. 34,575; and/or Kristina M. Grasso Reg. 39,205.**

Address all calls to: John James McGlew at telephone no. (914) 941-5600

Address all correspondence to:

**McGLEW AND TUTTLE, P.C.
SCARBOROUGH STATION
SCARBOROUGH, NEW YORK 10510-0827**

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor Emil ASCHENBRUCK

→Inventor's signature Emil Aschenbruck →Date 13. Oct. 2000

Residence Obere Sterkrader Str. 165, 47167 Duisburg, Germany Citizenship Germany

Post Office Address Obere Sterkrader Str. 165, 47167 Duisburg, Germany

Full name of second inventor Hans WEIBEL

→Inventor's signature Hans Weibel →Date 13.10.2000
Residence Henriette-Brey-Str. 8, 47608 Geldern, Germany Citizenship Germany
Post Office Address Henriette-Brey-Str. 8, 47608 Geldern, Germany

Full name of third inventor Dr. Markus BEUKENBERG

→Inventor's signature Markus Beukenberg →Date 31.10.2000
Residence Düppenbäcker Weg 24, 45481 Mülheim, Germany Citizenship Germany
Post Office Address Düppenbäcker Weg 24, 45481 Mülheim, Germany

Full name of fourth inventor _____

→Inventor's signature _____ →Date _____
Residence _____ Citizenship _____
Post Office Address _____

Full name of fifth inventor _____

→Inventor's signature _____ →Date _____
Residence _____ Citizenship _____
Post Office Address _____

Full name of sixth inventor _____

→Inventor's signature _____ →Date _____
Residence _____ Citizenship _____
Post Office Address _____

McGLEW AND TUTTLE, P.C.

REGISTERED PATENT ATTORNEY

JOHN JAMES McGLEW J.D., NY, NJ, DC BARS

THEOBALD DENGLER, PATENT AGENT

HILDA S. McGLEW M.D., PATENT AGENT

KRISTINA M. GRASSO, PATENT AGENT

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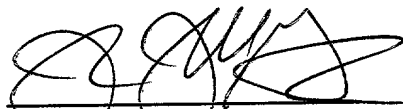
Sir:

Attached please find the complete application papers and fees in the above-identified application which are being placed in the U.S. Mail today, November 14, 2000, as Express Mail number EL597140979US.

A copy of the Express Mail receipt is also attached.

Respectfully submitted
for Applicant(s),

By:



John James McGlew

Reg. No. 31,903

McGLEW AND TUTTLE, P.C.

JJM:tf

Enclosures - Complete Application Papers and Fees
- Copy of Express Mail Receipt

DATED: November 14, 2000
SCARBOROUGH STATION
SCARBOROUGH, NEW YORK 10510-0827
(914) 941-5600

McGLEW AND TUTTLE, P.C., SCARBOROUGH STATION,
SCARBOROUGH, NEW YORK 10510-0827

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